WHAT IS CLAIMED IS:

1. A method for analyzing or designing a fluid extrusion device using a computer system comprising,

inputting fluid rheological data and extrusion device data into said computer system, said computer system comprising CFD numerical algorithms and a user interface;

computing flow characteristics of said extrusion device; and

extracting data relating to said flow characteristics.

2. A method according to Claim 1, wherein said fluid comprises a polymer.

3. A method according to Claim 2, wherein said polymer is selected from the group consisting of nylon-6, nylon-6,6, polyethylene, polypropylene, and polyester.

4. A method according to Claim 2, wherein said polymer further comprises additives, fillers or other solids.

5. A method according to Claim 1, wherein said extrusion device comprises a fiber spinneret pack.

6. A method according to Claim 1, wherein said rheological data comprises a relationship between shear and/or extensional viscosity with shear and/or extension rate and temperature.

7. A method according to Claim 1, wherein said extrusion device data comprises a filtration zone, at least one distribution plate and a die.

8. A method according to Claim 7 wherein the filtration zone comprises a sand cavity.

9. A method according to Claim 1, wherein said numerical algorithms comprise algorithms selected from the group consisting of coordinate transformation algorithms, root solving algorithms, sorting algorithms, mesh generation algorithms, statistical algorithms, curve fitting algorithms, functional minimization algorithms, interpolation and extrapolation algorithms, and linear and nonlinear equation solving algorithms.

10. A method according to Claim 1, wherein said computer system further comprises non-numerical algorithms.

11. A method according to Claim 1, wherein said user interface comprises functions selected from the group consisting of functions that prompt the user for appropriate input, issue warnings, display results, and translate user input and algorithm output into readily usable formats.

12. A method according to Claim 1, wherein said flow characteristics are selected from the group consisting of flow rates and fluid velocities at various positions within the pack, pressures at various positions within the pack, temperatures at various positions within the pack, the locations of polymer interfaces throughout the pack and shear and elongation rates at various positions within the pack.

13. A method according to Claim 1, wherein said extracted data is selected from the group consisting of flowrates through various channels within the pack, pressure drop across various channels within the pack, exit temperatures of various channels within the pack, polymer interface locations at various channel exits within the pack, shear rates and shear stresses at channel walls within the pack and measures of hydrodynamic instability at various positions within the pack.

14. A method according to Claim 1, wherein said extrusion device comprises channels within which fluid flow is characterized by a velocity profile that is fully developed instantaneously.

15. A method according to Claim 14, wherein said fluid flow is characterized by the following expression:

$$t_D / t_C = (\mathrm{Re}\, R) / (2L) << 1$$

wherein:

t_D = characteristic time scale for diffusive momentum transport in channel (□ to flow);

t_C = residence time in channel;

Re = the Reynolds number;

R = channel radius;

L = length of channel.

16. A computer system for analyzing or designing a fluid extrusion device comprising,

numerical algorithms; and

a user interface,

wherein said system can be used to perform the method of Claim 1.